

PATENT**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE****In re Application of:**

Larry D. Kinsman

Serial No.: 09/473,263

Filed: December 27, 1999

**For: VERTICALLY MOUNTABLE
SEMICONDUCTOR DEVICE AND
METHODS**

Examiner: L. Cruz

Group Art Unit: 2815

Attorney Docket No.: 3399.2US (97-629.2)

CERTIFICATE OF TRANSMISSION

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AMENDMENT UNDER 37 C.F.R. § 1.116

Box AF
Commissioner for Patents
Washington, D.C. 20231

Sir:

This Amendment is in response to the Final Office Action mailed on November 30, 2001, the initial period for response to which is set to expire on February 28, 2002. This Amendment is being filed within two months of the mailing date of the Final Office Action.

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REMARKS

The Final Office Action mailed on November 30, 2001, has been received and reviewed. Claims 1 through 6 and 8 through 24 are currently pending in the application. Each of claims 1 through 6 and 8 through 24 stands rejected.

Reconsideration of the above-referenced application is respectfully requested.

Rejections Under 35 U.S.C. § 102(b)

Claims 1 through 6 and 8 through 24 stand rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent 5,786,628 to Beilstein, Jr. et al. (hereinafter "Beilstein").

A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference. *Verdegaal Brothers v. Union Oil Co. of California*, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). The identical invention must be shown in as complete detail as is contained in the claim. *Richardson v. Suzuki Motor Co.*, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989).

Beilstein teaches electronic modules 11 that include multiple integrated circuit chips 13 stacked in back side-to-active surface arrangement. So-called "transfer metal 15", or wiring, is positioned across the active surface of each chip 13 of the module 11 to establish communication between an I/O pad on the active surface of the chip 13 and a corresponding electrical contact 27 formed on a common side surface 25 of the module 11, the side surface 25 being formed by aligned peripheral edges of the chips 13 of the module 11. Col. 8, lines 4-7, 33-36.

By way of contrast with Beilstein, independent claim 1 recites a vertical surface mount semiconductor device that includes "bond pads disposed on a surface[,] . . . adjacent an edge" of the semiconductor device, and "arranged substantially in-line . . ." (Emphasis supplied). In addition, independent claim 1 recites that "conductive bumps [are] disposed adjacent selected bond pads" and that such conductive bumps are "configured to form a conductive joint between at least one of [the] selected bond pads and a corresponding terminal of a substrate . . ."

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Independent claim 9 similarly recites a vertical surface mount semiconductor device that includes, among other things, a plurality of bond pads *on a surface* thereof and *adjacent an edge* thereof. Independent claim 9 also recites that these bond pads are located substantially in-line and that selected bond pads have conductive bumps adjacent thereto.

It is not clear whether the Office has taken the position that it is the I/O pads of the chips 13 described in Beilstein that are the "bond pads" recited in independent claim 1, that the transfer metal 15 is the equivalent of a "bond pad", or that the "bond pads" are the contacts 27 that are formed on a common side surface 25 of the module 11 of stacked chips 13.

It is respectfully submitted that, in either event, Beilstein does not expressly or inherently describe each and every element of either independent claim 1 or independent claim 9.

Assuming, *arguendo*, that the I/O pads of the chips 13 described in Beilstein are the equivalent of the bond pads referred to in independent claim 1, it is clear from the description of Beilstein that none of these I/O pads would be located adjacent an edge of the chip 13 since a transfer metal 15 is required to facilitate electrical connection of each such I/O pad to a corresponding contact 27 positioned on the side of the chip 13.

Moreover, Beilstein neither expressly nor inherently describes that conductive bumps may be disposed adjacent the I/O pads of the chips 13 of the module 11 described therein, or that such conductive bumps could be configured to form a conductive joint between an I/O pad and a corresponding terminal of a substrate. Rather, the transfer metal 15 is positioned adjacent to the I/O pad and extends toward an edge of the chip 13 to a location remote from the I/O pad where a corresponding contact 27 is located. A conductive bump may, in turn, be secured to the contact 27 to facilitate the formation of a conductive joint 29 between the contact 27 and a corresponding terminal of a substrate. Thus, the conductive joint 29 of Beilstein is positioned at a location that is remote from its corresponding I/O pad, not adjacent thereto.

Further, Beilstein does not expressly or inherently describe that the I/O pads of any of the chips 13 of the module 11 are arranged substantially in-line.

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As for the position that transfer metal 15, which is depicted and described as an elongate conductive trace that extends between an I/O pad of a chip 13 of the module 11 and a side edge 25 of the module 11 to a corresponding contact 27 thereon, it is respectfully submitted that it is well known and commonly accepted in the art that a conductive traces and bond pads are very different types of structures with very different functions. Further, the conductive joints 29 that are described in Beilstein are not positioned adjacent to the transfer metal 15, but on contacts 27 that are located between the transfer metal 15 and a corresponding conductive joint 29. Accordingly, it is respectfully submitted that the transfer metal 15 elements described in Beilstein are not bond pads within the meaning of either independent claim 1 or independent claim 9.

Alternatively, assuming, *arguendo*, that the contacts 27 of the module 11 described in Beilstein are the equivalent of the bond pads that are recited in independent claims 1 and 9, it is clear from the description of Beilstein that contacts 27 are not located on the surfaces of any of the chips 13 of the module 11 but, rather, on a side surface of the module 11 itself. Moreover, the contact pads 27 of the module 11 described in Beilstein are not located *adjacent* an edge of any of the chips 13 thereof but, rather, *on* the side surface 25 of the module 11, which is formed by the edges of the chips 13 thereof.

For these reasons, it is respectfully submitted that Beilstein does not expressly or inherently describe each and every element recited in either independent claim 1 or independent claim 9 and, thus, that independent claims 1 and 9 are not anticipated by Beilstein under 35 U.S.C. § 102(b).

Each of claims 2 through 6 and 8 is allowable, among other reasons, as depending from claim 1, which is allowable.

Claim 6 is further allowable since Beilstein lacks any express or inherent description of a support footing that is located on a surface of one of the chips 13 of the module 11 and adjacent to an edge of that chip 13.

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Claims 10 through 12 are each allowable, among other reasons, as depending from claim 9, which is allowable.

Independent claim 13 recites a chip-on-board assembly that includes a substrate, a semiconductor device configured to be positioned on the substrate, and electrically conductive joints configured to be disposed directly between and to establish communication between selected bond pads of the semiconductor device and corresponding terminals of the substrate. The bond pads of the semiconductor device are located on a surface thereof, adjacent an edge of the surface, and arranged substantially in-line.

It is respectfully submitted that Beilstein neither expressly nor inherently describes each and every element of independent claim 13.

Again, assuming, *arguendo*, that the I/O pads of the chips 13 described in Beilstein are equivalent to the bond pads recited in independent claim 13, Beilstein lacks any express or inherent description that the I/O pads are located adjacent an edge of the surface of the chip 13 or that the I/O pads are arranged substantially in-line. Moreover, Beilstein does not expressly or inherently describe that electrically conductive joints may be disposed directly between selected bond pads and their corresponding terminals of a substrate to which the chip 13 is configured to be secured. Rather, in Beilstein, conductive bumps 29 are positioned between a contact 27 that is located remotely from its corresponding I/O pad and a corresponding terminal of a substrate.

In addition, assuming, *arguendo*, that the transfer metal 15 of Beilstein could be considered to be a bond pad, it is respectfully submitted that Beilstein does not expressly or inherently describe that the conductive bumps 29 thereof are "configured to be disposed directly between . . . selected bond pads and corresponding terminals." Instead, Beilstein describes each conductive bump 29 as being separated from its corresponding transfer metal 15 by way of a contact 27.

Next, assuming, *arguendo*, that the contacts 27 of Beilstein are equivalent to the bond pads recited in independent claim 13, it is respectfully submitted that Beilstein lacks any express

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or inherent description that the contacts 27 are located *on a surface* of a chip 13 or *adjacent to an edge* thereof. Rather, Beilstein quite clearly teaches that contacts 27 are formed *at an edge* of each chip 13, on a side surface 25 that is formed by the aligned edges of stacked chips 13.

As Beilstein does not expressly or inherently describe each and every element of independent claim 13, it is respectfully submitted that, under 35 U.S.C. § 102(b), independent claim 13 is not anticipated by Beilstein.

Each of claims 14 through 18 is allowable, among other reasons, as depending either directly or indirectly from claim 13, which is allowable.

Independent claim 19 recites a computer that includes, among other things, a semiconductor device including a semiconductor die with a plurality of bond pads on a surface thereof, proximate an edge thereof, and disposed substantially in-line. In addition, the semiconductor device of independent claim 19 includes conductive bumps that are configured to form conductive joints between selected bond pads of the semiconductor die and corresponding terminals of a substrate.

It is respectfully submitted that, for the same reasons provided above with respect to independent claims 1 and 9, Beilstein does not expressly or inherently describe each and every element of independent claim 19. Accordingly, it is respectfully submitted that, under 35 U.S.C. § 102(b), independent claim 19 is allowable over Beilstein.

Each of claims 20 through 24 is allowable, among other reasons, as depending either directly or indirectly from claim 19, which is allowable.

In view of the foregoing, it is respectfully requested that the 35 U.S.C. § 102(b) rejections of claims 1 through 6 and 8 through 24 be withdrawn.

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35 U.S.C. § 101 Double Patenting Rejection

Claims 1 through 24 stand rejected under 35 U.S.C. § 101 as claiming the same invention as that of claims 1 through 21 of prior U.S. Patent 6,140,696 (hereinafter "the '696 Patent").

With respect to double patenting rejections based on 35 U.S.C. § 101, M.P.E.P. § 804 provides:

A reliable test for double patenting under 35 U.S.C. 101 is whether a claim in the application could be literally infringed without literally infringing a corresponding claim in the patent [or related pending patent application]. *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970). Is there an embodiment of the invention that falls within the scope of one claim, but not the other? If there is such an embodiment, then identical subject matter is not defined by both claims and statutory double patenting would not exist.

It is respectfully submitted that several embodiments of the claimed invention exist that fall within the scope of the subject matter that is recited in claims 1 through 6 and 8 through 24 without falling within the scope of the claims of the '696 Patent, and vice-versa. Accordingly, it is respectfully submitted that claims 1 through 6 and 8 through 24 cannot be considered to recite identical subject matter to that recited in the claims of the '696 Patent and, thus, that there are no grounds for the 35 U.S.C. § 101 double patenting rejection.

Claim 1 has apparently been rejected as recited subject matter identical in scope to the subject matter recited in claim 1 of the '696 Patent.

While claim 1 of the above-referenced application recites a semiconductor device having a plurality of bond pads disposed on a surface of said semiconductor device adjacent an edge thereof and arranged substantially in-line, claim 1 of the '696 Patent does not include any such limitations.

Therefore, presently amended independent claim 1 of the application is not subject matter identical in scope to the subject matter recited in claim 1 of the '696 Patent under 35 U.S.C. § 101.

Claims 2 through 6 and 8 are each allowable, among other reasons, as depending either directly or indirectly from claim 1, which is allowable.

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Independent claim 9 was apparent rejected as recited subject matter that is identical in scope to the subject matter of claim 8 of the '696 Patent.

While claim 9 recites a semiconductor device having a plurality of bond pads disposed on a surface of said semiconductor device adjacent an edge thereof and arranged substantially in-line, claim 8 of the '696 Patent does not include any such limitations.

Therefore, presently amended independent claim 9 of the application is claiming a different invention than claim 8 of the '696 Patent under 35 U.S.C. § 101.

Each of claims 10 through 12 is allowable, among other reasons, as depending from claim 9, which is allowable.

The Office apparently rejected independent claim 13 on the basis that it recites subject matter which is identical in scope to the subject matter recited in independent claim 11 of the '696 Patent. While presently amended independent claim 13 of the above-referenced application recites a "semiconductor device having a plurality of bond pads on a surface thereof, each of said plurality of bond pads being located adjacent an edge of said surface and arranged substantially in-line", claim 11 of the '696 Patent does not.

Due to this clear difference in scope, it is respectfully submitted that claim 13 of the above-referenced application is allowable under 35 U.S.C. § 101 over claim 11 of the '696 Patent.

Claims 14 through 18 are each allowable, among other reasons, as depending either directly or indirectly from claim 13, which is allowable.

Independent claim 19 apparently stands rejected under 35 U.S.C. § 101 for reciting subject matter of a scope identical to that recited in claim 17 of the '696 Patent.

While the computer the presently amended independent claim 19 of the present application recites "a semiconductor die with a plurality of circuit traces and a plurality of bond pads disposed on a surface of said semiconductor die proximate an edge thereof in a substantially in-line arrangement", claim 17 of the '696 Patent does not.

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Therefore, it is respectfully submitted that claim 19 is allowable under 35 U.S.C. § 101 over claims 17 of the '696 Patent.

Claims 20 through 24 are each allowable, among other reasons, as depending either directly or indirectly from claim 19, which is allowable.

For these reasons, it is respectfully requested that the 35 U.S.C. § 101 double patenting rejections of claims 1-6 and 8-24 be withdrawn.

ENTRY OF AMENDMENT

It is respectfully requested that the argument presented herein be entered into the above-referenced application. It is submitted that these arguments clarify the remaining issues in the above-referenced application and that they neither introduce new matter into the application nor require an additional search or any additional consideration for new issues regarding the claimed invention. It is respectfully submitted that the arguments presented herein clearly set forth the issues for any subsequent appeal, if necessary. In the event that this Amendment is not entered, entry of the same is respectfully requested upon the filing of a Notice of Appeal.

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CONCLUSION

It is respectfully submitted that each of claims 1 through 6 and 8 through 24 is allowable. An early indication of the allowability of each of these claims is respectfully solicited, as is an indication that the above-referenced application has been passed for issuance. If any issues preventing the allowance of any of claims 1 through 6 or 8 through 24 remain which might be resolved by way of a telephone conference, the Office is kindly invited to contact the undersigned.

Respectfully submitted,



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